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# Copy and Recall Therapy for Dysgraphia and Memory in Aphasia

Costello M.[a,*], Balasubramanian V.[b]

[a] *Seton Hall University and LaSalle University*
[b] *Seton Hall University*

This investigation was designed to examine the use of Copy and Recall Therapy (CART) on the working memory, frequency, imageability, and length of target words during matched spelling tasks of a participant with anomic aphasia and phonological dysgraphia. Phonological dysgraphia is an impairment of written language processing characterized by disproportionate difficulty in spelling non-words, low frequency, and low imageability words (Beeson, Rising, Kim, & Rapcsak, 2010). There is compelling evidence that the phonological impairment is evident on tasks that require segmentation and manipulation as well as those that require phoneme-grapheme conversion (Rapcsak et al., 2009). A phonological dysgraphia can occur when the mapping process within verbal working memory is insufficient in the production from phonological to orthographic words, impaired spelling, and possibly handwriting (Berninger, 2008). This study implemented Copy and Recall Therapy (CART) to enhance the ability to spell words for an individual with anomic aphasia and phonological dysgraphia. CART is an approach that uses repeated copying of target words and recall trials to re-establish the ability to spell specific words (Beeson, 2004). The present study investigated whether the use of CART would strengthen the lexical-semantic and orthographic representations from working memory for this participant. A single-subject (ABA) design was used to evaluate the effectiveness of CART and working memory in one participant (P1). P1 was provided treatment one time per week for 10 weeks for 45 minutes. Performance was evaluated during three phases: pre-treatment baseline, treatment, and follow-up. Two sets of words (n=16) were matched for word frequency, imageability, and length. Spelling performance on the treated word list (n=16) with CART was evaluated in one pre-treatment baseline session. During the treatment phase, P1 was given the treated matched set of words to use with CART. Preselected word lists from the PALPA (subtest 25) depicting frequency and imageability were selected and P1 was asked to write each word to dictation while using CART. Sixteen target words were selected each session to use with CART (8 words were low frequency (LF)and low imageability (LI) and the other (8 words were high frequency (HF) and high imageability (HI) both match for length as well. The words from the control list (n=16; 8 words were (LF) and (LI) and 8 words were (HF) and (HI) were not used in conjunction with CART. P1 was instructed not to practice the words outside the treatment sessions. After 20 weeks, P1 was reevaluated on the previous list of matched words from the PALPA (subtest 25). P1 was asked to spell the list of matched words from dictation without CART. In the results, the spelling of the controlled HF and HI words without CART increased from 50% at baseline to 70% (p =.006) during follow-up. In the LI and LF word list, P1's accuracy increased from 43% at baseline to 63% (p= .021) during follow-up. The results of this study concluded that CART therapy will increase the working memory of spelling for HI, HF, LF, and LI words in a participant with phonological dysgraphia and anomic aphasia.

| | **Participant # 1** |
|---|---|
| **Aphasia Quotient** | 97 |
| | |

* Corresponding author. Tel.: 215-951-1888 .
*E-mail address:* costellom3@lasalle.edu .



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|---|---|
| **Boston Naming Test** | 56/60 |
| **John Hopkins Dyslexia Batteries-Reading** | **Grammatical word class**<br>42/42 in nouns, adjectives, verbs, and functor words.<br>**Word Concreteness**<br>14/14<br>**Word Length List**<br>35/35<br>**Nonwords:** 33/34 on pseudohomophones and nonhomphones |
| **John Hopkins Dysgraphia Batteries-Writing** | **Grammatical word class**<br>8/14: HF nouns<br>7/14: L/F nouns<br>11/14: HF adj<br>10/14: LF adj<br>**Word Concreteness**<br>6/7: HF concrete<br>6/7: MF concrete<br>6/7: LF concrete<br>5/7: HF abstract<br>6/7: MF abstract<br>4/7: LF abstract<br>**Nonwords**<br>20/34 nonwords<br>**Sound-to-Letter Probability**<br>24/30 high probability<br>54/80 low probability<br>**Oral Spelling**<br>21 LF words only: 13/21 –greatest difficulty with adj and verbs |
| **PALPA subtests** | Subtest # 21:<br>**Letter Discrimination-Nonwords**: 9/15 |

| | |
|---|---|
| | Subtest #45: 8/15 |
| **Phonological Ability Subtests** | Rhyme: 100%<br>Sound Segmentation: 92%<br>Phoneme Deletion: 100%<br>Sound Blending: 100%<br>Phoneme Replacement: 85% |
| **Cognitive Battery of Test** | Revised Token Test Score: 86%<br>Wisconsin Cart Sorting Test: 27 errors, Standard Score 103; T-Score 52; 58$^{th}$ percentile<br>Processing Speed Index: 86<br>Working Memory Index of the Wechsler Adult Intelligence Scale-4: 63<br>Digit Span Test: 3 |